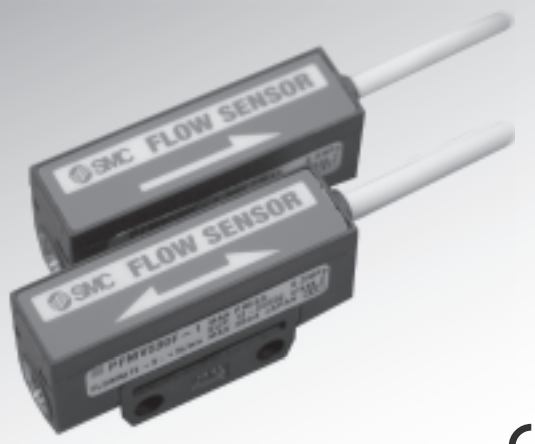
Flow Sensor
Instruction Manual
PFMV5 Series



Thank you for purchasing the SMC PFMV5 Series Flow Sensor.

Please read this manual carefully before operating the flow sensor and make sure you understand the flow sensor, its capabilities and limitations.

Please keep this manual handy for future reference.

SMC Corporation URL http://www.smcworld.com

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OPERATOR

- This manual has been written for those who have knowledge of machinery and apparatuses that use pneumatic equipment and have full knowledge of assembly, operation and maintenance of such equipment.
- Please read this manual carefully and understand it before assembling, operating or providing maintenance service to the flow sensor.

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Safety Instructions

The Flow Sensor have in after referred to as flow sensor and this manual contain essential information for the protection of users and others from possible injury and property damage and to ensure correct handling.

Please check that you fully understand the definition of the following messages (signs) before going on to read the text, and always follow the instructions.

IMPORTANT MESSAGES	
Read this manual and follow its instructions. Signal words such as WARNING, CAUTION and NOTE, will be followed by important safety information that must be carefully reviewed.	
⚠WARNING	Indicates a potentially hazardous situation which could result in death or serious injury if you do not follow instructions.
⚠CAUTION	Indicates a potentially hazardous situation which if not avoided, may result in minor injury or moderate injury.
NOTE	Gives you helpful information.

⚠WARNING

Do not disassemble, modify (including change of printed circuit board) or repair.

An injury or failure can result.

Do not operate outside of the specification.

Fire, malfunction or flow sensor damage can result.
Please use it after confirming the specification.

Do not operate in an environment of inflammable, explosive or corrosive gas.

Fire or an explosion can result.
This flow sensor is not an explosion proof type.

To avoid fire and explosion, Do not use the product for flammable fluid.

This flow sensor is designed for air. Only dry air, N_2 are applicable.

Do not use this product near by a place where static electricity is a problem.

Otherwise it can cause failure or malfunction of a system.

These instructions must be followed while in maintenance ; Turn off the power supply, stop the supplied air, exhaust the residual pressure and verify the release of air before performing maintenance.

Otherwise it can cause injury.

⚠CAUTION

Perform proper functional checks and leak tests after maintenance.

Stop operation when an abnormality is observed such that the flow sensor does not work properly or there is a leakage of fluid. Safety is not be assured due to unexpected malfunction. When leakage occurred from other parts except piping, the flow sensor might break. Cut off power supply and stop supplying pressure. Don't apply pressure at leaking condition.

Precaution on Handling

Use UL approved product for direct current power supply.

1. Clamping voltage current circuit complies with UL508
   Circuit which power supply if insulation transducer satisfying following conditions
   Max. voltage (No load) : 30Vrms (42.4V peak) or less
   Max. current : (1) 8A or less (Including short circuit)
   (2) When limited by the circuit protector (fuse etc.) with the ratings in the table below.

Voltage without load (V peak)	Max. current rating (A)
0 to 20 [V]	5.0
Over 20 [V] up to 30 [V]	100/peak voltage

2. Circuit (of class 2) which is of 30Vrms (42.4V peak) or less with the power supply unit of class 2 complying with L1310 or transducer of class 2 complying with UL1585.

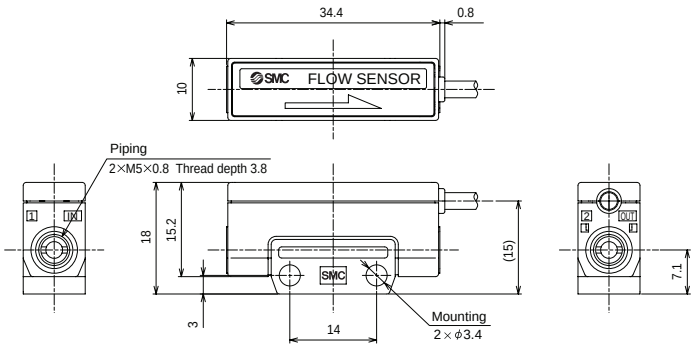
NOTE

Follow the instructions given below when handling the flow sensor. Otherwise, the flow sensor may be damaged or may fail, thereby resulting in malfunction.

- Make sure to use a sensor by the specified voltage.
- Make sure to use specified measurement flow and operating pressure.

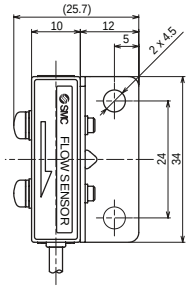
- Prepare maintenance space.
- Do not drop or bump, or apply excess impact.
- Do not pull the lead wire forcefully, not lift the product by pulling the lead wire. (Tensile force 49N or less).
- Mount a sensor by observing the proper tightening torque.
- Install or connect the flow sensor so that the flow direction specified on the label matches with actual flow direction.
- Pipe the flow sensor after eliminating dust in piping by air blow to avoid failure and malfunction.
- Use dry air which complies with the quality grade of ISO 8573-1 1.1.2 to 1.6.2 : 2001.
- If the entering of foreign material to the fluid is possible, install and pipe the filter or the mist separator to the inle to avoid failure and malfunction.
- Avoid repeatedly bending or stretching the lead wire.
- Wire correctly.
- Do not wire while the power is supplied.
- Do not wire in conjunction with power lines or high voltage lines.
- Wire as short as possible to avoid the affect of noise and surge.
- Never use in the presence of explosive gases.
- Do not use in an area where magnetic field is generated to avoid malfunction of sensor.
- Do not operate where the flow sensor is exposed to water.
- Do not use the sensor for poisonous substances, deleterious substances and corrosive gas. This sensor is not a explosion proof. Do not use for flammable gas.
- Do not apply heat cycle to the flow sensor.
- Do not used in an area where surges are generated.
- Sensors are not equipped with surge protection against lightening.
- Avoid using sensors in an environment where the likelihood of splashing or spraying of water, chemicals, and oil to avoid failure and malfunction.
- Consider operating environment according to protection class.
- Do not use the flow sensor where exposed to vibration or impact. Vibration may interfere correct measurement.
- Flow sensor has to be fixed when used.
- Operation under low temperature (5℃ or less) leads to cause damage or operation failure due to frozen moist in the fluid or air.
- Do not short circuit the load.
- Maintenance and inspection should be performed periodically.
- Analog output may fluctuate by 2 to 3% for 5 minutes after supplying power to the flow sensor.
- Do not poke inside a piping port with a stick.

Dimensions and Names of Individual Parts (unit: mm)

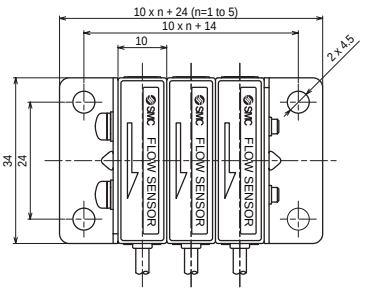


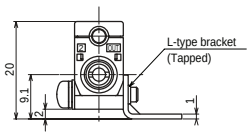
With L-type bracket

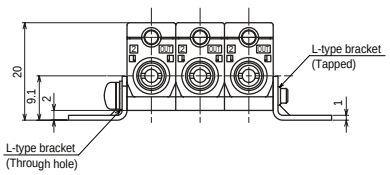
Mount on one side



Mount on both sides







Model Indication Method

PFM □ □ - □ - □ □

Type

Model	Contents
V5	Remote type sensor

Measurement flow range

Model	Contents
05	0.0 to 0.5 ℓ/min
10	0.0 to 1.0 ℓ/min
30	0.0 to 3.0 ℓ/min
05F	-0.5 to 0.5 ℓ/min
10F	-1.0 to 1.0 ℓ/min
30F	-3.0 to 3.0 ℓ/min

Output specification

Model	Contents
1	Analog (1 to 5V)

Operation manual

Model	Contents
Nil	With Operation manual (in Japanese and English)
N	Without Operation manual

Option(Included in the same package)

Model	Contents
Nil	Without L-type bracket
A	With 2 L-type brackets and 2 mount screws M3 x 15L included for 1station

L-type bracket

When optional part is needed by part alone, or to be mounted to the manifold, please order by part number below.

ZS - 36 - A □

Stations

1	1 stn	2 L-type brackets, 2 mount screws M3 x 15L included
2	2 stns	2 L-type brackets, 2 mount screws M3 x 25L included
3	3 stns	2 L-type brackets, 2 mount screws M3 x 35L included
4	4 stns	2 L-type brackets, 2 mount screws M3 x 45L included
5	5 stns	2 L-type brackets, 2 mount screws M3 x 55L included

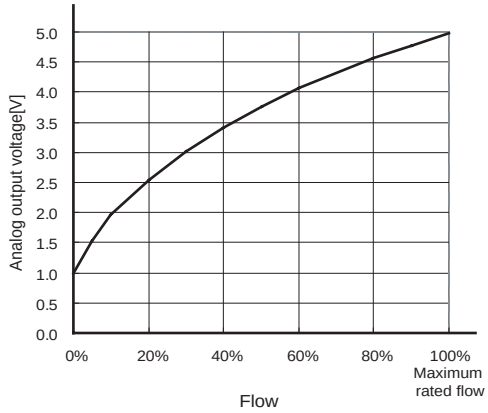
Specifications

Model		PFMV505	PFMV510	PFMV530	PFMV505F	PFMV510F	PFMV530F
Measured fluid		Dry air, N_2 (Air quality class is ISO 8573-1 1.1.2 to 1.6.2 : 2001)					
Flow rate (measurement range)		ℓ/min[Note1] 0 to 0.5	0 to 1	0 to 3	-0.5 to 0.5[Note2]	-1 to 1[Note2]	-3 to 3[Note2]
Repeatability		± 2%F.S. or less[Note3]					
Pressure characteristic (0kPa reference[Note4])		± 2%F.S. or less (0 to 300kPa) ± 5%F.S. or less (-70 to 0kPa)					
Temperature characteristics (25℃ reference)		± 2% F.S. or less (15 to 35 ℃) ± 5% F.S. or less (0 to 50 ℃)					
Pressure rate[Note5]		-70kPa to 300kPa					
Operating pressure range[Note6]		-100kPa to 400kPa					
Proof pressure		500kPa					
Analog output (Non-linear output)		At voltage output : 1 to 5V Output impedance : approx. 1k Ω					
Response time		5ms or less (Response 90%)					
Source voltage		12 to 24VDC ±10%, ripple(p-p) 10% or less (Protected against inverse connection)					
Power consumption		16mA or less					
Resistance	Enclosure	IP40					
	Operating fluid temp.	0 to 50℃ (No freezing or condensation)					
	Operating temp. range	0 to 50℃ (No freezing or condensation)					
	Storage temp. range	-10 to 60℃ (No freezing or condensation)					
	Operating humidity range	35 to 85%R.H. (No condensation)					
	Storage humidity range	35 to 85%R.H. (No condensation)					
	Withstand voltage	1000V AC, 1min Between battery and the body					
	Insulation resistance	50MΩ or more(500V DC Mega) Between battery and the body					
	Vibration resistance	10 to 150Hz 1.5mm amplitude 98m/s² acceleration in X, Y, Z directions for 2 hours(Power is not supplied)					
	Impact resistance	980m/s² X, Y, Z directions 3 times for each(Power is not supplied)					
Port size		M5×0.8 (tightening torque : 1 to 1.5N•m or less)					
Fluid contact material		PPS, Si, Au, SUS316, C3604(Electroless nickel plating)					
Lead wire		3 core vinyl cabtire cable φ 2.6, 0.15mm², 2m					
Weight		10g (without lead wire)					

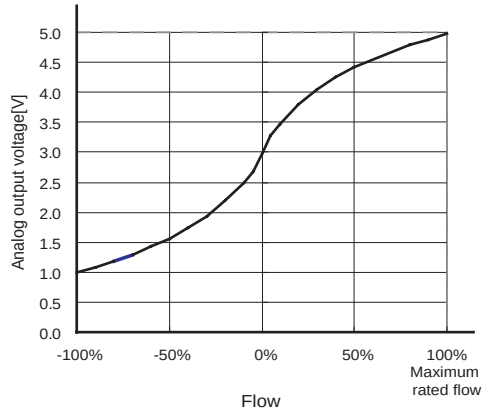
Note 1) Converted value of volume flow at ANR (20 ℃, 101.3kPa, 65%R.H.).
Note 2) Analog output shows 3V when flow is zero. Changes to 5V side when flow direction is IN → OUT. 1V side when OUT → IN.
Note 3) %F.S. in the table takes 4V (1-5V) as a full scale.
Note 4) 0kPa means release to the atmosphere.
Note 5) Applicable pressure range.
Note 6) Pressure range satisfies product specification.

Flow characteristic chart (Reference)

PFMV5(05/10/30)



PFMV5(05/10/30)F

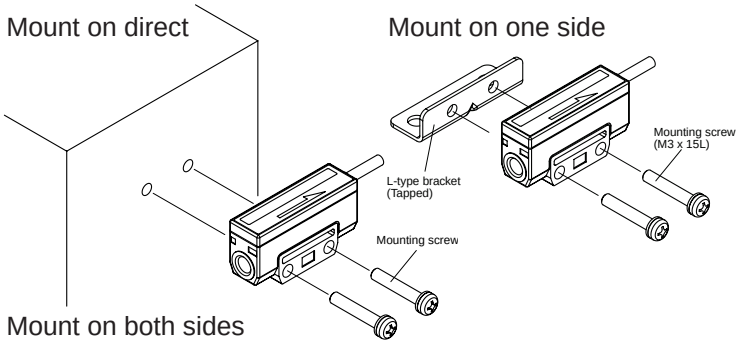


- Refer to catalog for details of flow characteristic.

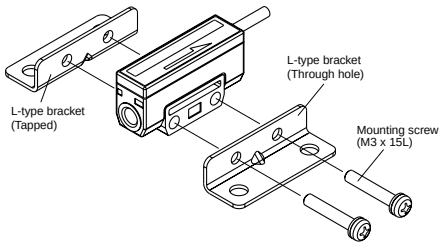
Mounting and Installation (unit: mm)

Mount on direct

Mount on one side

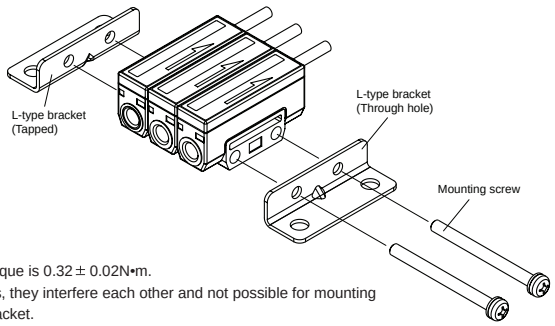


Mount on both sides



- Thread tightening torque is 0.32 ± 0.02N•m.

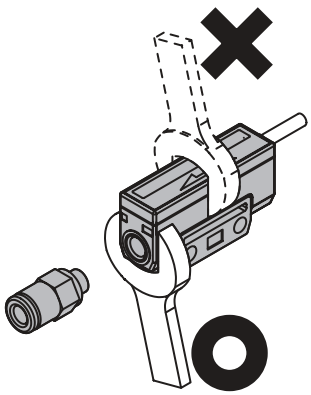
Manifold mount (using ZS-36-A□)



- Thread tightening torque is 0.32 ± 0.02N•m.
- Depending on fittings, they interfere each other and not possible for mounting in series by using bracket.

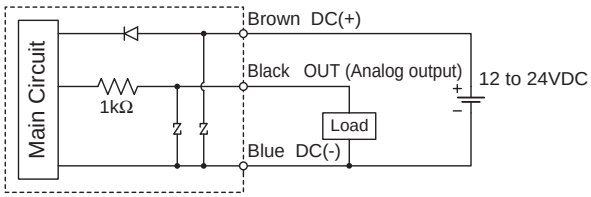
Piping

During installation of the flow sensor to the pipe, hold the body with specified spanner



Tightening torque to mount the fitting is 1 to 1.5N·m

Circuit



Analog output : 1 to 5V
Output impedance : Approx. 1kΩ

Recommended fitting list

PFMV5 series recommended fitting list

One-Touch fitting
- Male Connector (One-Touch Male Connector)/KQ2H04-M5
- Hexagon Socket head Male Connector/KQ2S04-M5
- Male Elbow/KQ2L04-M5

One-Touch mini fittings
- Male Connector/KJH04-M5
- Hexagon Socket head Male Connector/KJS04-M5
- Male Elbow/KJL04-M5

Miniature fitting
- Barb fittings for nylon tubing/M-5AN-4/M-5AN-6